

# Work Order ID 75633

\*75633\*

Page 1

October-27-11 11:38:06 AM

Item ID: D6006-129 Accept \*N9000040100\* Setup Start \*NS1\*  
 Revision ID: Stop \*NS2\*  
 Item Name: Crosstube Material  
 Start Date: 27/10/2011 Start Qty: 20.00 \*20\* Cust Item ID:  
 Required Date: 29/03/2013 Req'd Qty: 20.00 \*20\* Customer:  
 Reference:

Approvals: Process Plan: M.L.J Date: 11/10/27 Tooling: Date: Run Start \*NR1\*  
 QC: Date: SPC (Y/N): Date: Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D6006	Rev A								

100 r PURCHASING 0.00

\*100\*

Purchasing

Purchasing

Memo

0.00

Issue P/O: 15346 a) Order as per Dwg D6006 b) Material: 3.250  
 x 0.515 wall 7075-T6/T6511 (WW-T-700/7 or QQ-A-225/9 or QQ-A-200/11)  
 seamless aluminum tube c) Minimum ultimate tensile strength = 77 ksi d)  
 Minimum tensile yield strength = 66 ks

CX 11/11/03 20

110

Receive & Inspect for Damage & Mat'l Certs

0.00

\*110\*

Packaging

Packaging

Memo

0.00

Ensure material certification is attached

10/30/103 24

120

QC6- Inspect dimensions to drawing

0.00

\*120\*

QC

Quality Control

Memo

0.00

Ensure Material certification comply to Dwg D6006

13/1/16  
 13/1/16

Y24  
 10

\* see notes extension Reels \*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Work Order ID 75633

**\*75633\***

Page 2

October-27-11 11:38:07 AM

Item ID: D6006-129

Accept

**\*N9000040100\***

Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Material

Start Date: 27/10/2011 Start Qty: 20.00

**\*20\***

Cust Item ID:

Required Date: 29/03/2013 Req'd Qty: 20.00

**\*20\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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130 Chemical Conversion Coat per QSI005 4.1

0.00

**\*130\***

HandFinish

Memo

0.00

Hand Finishing

140 QC3- Inspect Part Finish

0.00

**\*140\***

QC

Memo

0.00

Quality Control

150 Identify as per dwg & Stock Location: **L/G**

0.00

**\*150\***

Packaging

Memo

0.00

Packaging

*mm*  
13/01/17

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

October-27-11 11:38:07 AM

**\*75633\***

Page 3

**Accept**

**\*N900040100\***

Setup Start \*NS1\*

Revision ID:

**Item Name:** Crosstube Material

Stop \*NS2\*

**Start Date:** 27/10/2011      **Start Qty:** 20.00

**\*20\***

**Cust Item ID:**

**Required Date:** 29/03/2013      **Req'd Qty:** 20.00

\*20\*

**Customer:**

**Reference:**

**Approvals:**      **Process Plan:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Tooling:** \_\_\_\_\_ **Date:** \_\_\_\_\_

Run Start \*NR1\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop \*NR2\*

Sequence ID/  
Work Center ID

### Operation Description

Set Up/  
Run Hours**Tool ID****Tool #****Plan  
Code**

**Accept  
Qty**

Reject  
QtyReject  
Number

**Insp.  
Stamp**

160

QC21- Final Inspection - Work Order Release

0.00

**\*160\***

QC

## Memo

0.00

## Quality Control

13/01/22

PL 13-01-18

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Picklist Print

October-27-11 11:38:14 AM

Page 1

Work Order ID: 75633

\*75633\*

Parent Item: D6006-129

\*D6006-129\*

Parent Item Name: Crosstube Material

Start Date: 27/10/2011

Required Date: 29/03/2013

Start Qty: 20.00

Required Qty: 20.00

Comments: IPP Rev:C04.06.15Added tolerance to Step 2KJ/JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
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D6006-129P

Purchased

No

110

Each

0.0000

1

20

\*D6006-129P\*

Crosstube material

\*\*

13/01/03 (24)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries





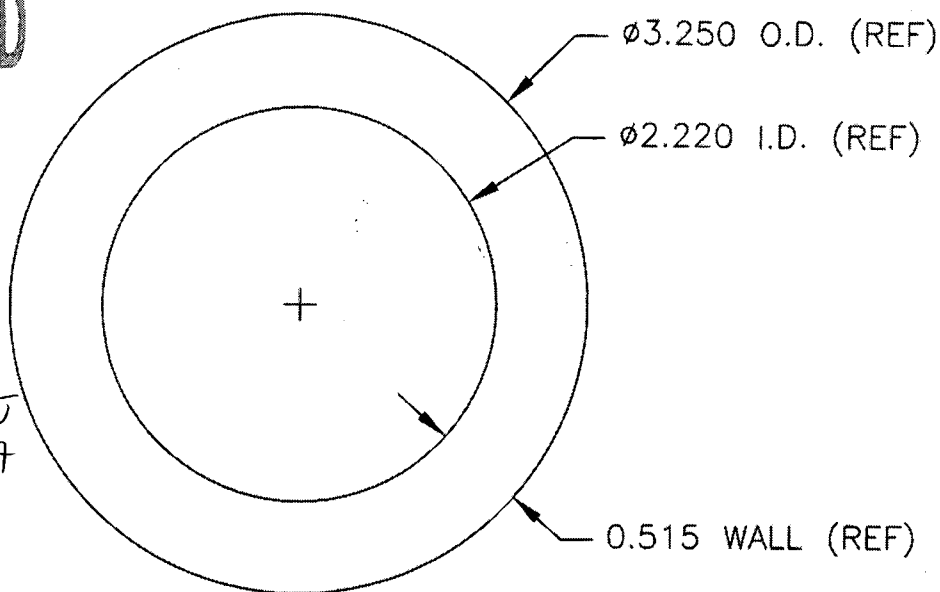
DESIGN <i>CP</i>	DRAWN BY <i>CP</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D6006	REV. A SHEET 1 OF 1
DATE 00.11.17		TITLE CROSSTUBE MATERIAL	SCALE 1:1
A	00.11.17	NEW ISSUE	

## SPECIFICATION CONTROL DRAWING

**RELEASED**  
00.11.24 *[Signature]*

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO 75633 M.L.J

11/10/27



### NOTES

- 1) D6006-XXX CROSSTUBE  
LENGTH

WHERE XXX IS LENGTH IN INCHES  
EG. 129" LONG TUBE: D6006-129

- 2) MATERIAL: 3.250 OD x 0.515 WALL 7075-T6/T6511 (WW-T-700/7 OR QQ-A-225/9 OR QQ-A-200/11) SEAMLESS ALUMINUM TUBE.  
MINIMUM ULTIMATE TENSILE STRENGTH = 77 ksi  
MINIMUM YIELD TENSILE STRENGTH = 66 ksi
- 3) TOLERANCES ARE PER ASTM B210 AS FOLLOWS:  
O.D.:  $\pm 0.008$  MEAN ( $\pm 0.016$  INCLUDING OVALITY)  
WALL:  $\pm 0.020$  MEAN ( $\pm 0.052$  INCLUDING ECCENTRICITY)  
LENGTH: XXX  $+0.188/-0.000$   
STRAIGHTNESS: 0.010" DEVIATION / 12" LENGTH
- 4) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 5) CHEMICAL CONVERSION COAT PER DART QSI 005 4.1

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

## Packinglist ALUnna AG

ALUnna ref. no.	44989/200
Customer PO.	Po. 15346
Date:	11.30.12

**Boxmarking:**

Boxmarking:

DARR Aerospace	Po. 15346
D6006 - 129	
Made in Germany	Dest.: Hawkesbury Ont, Canada

Date: 11.30.12

We hereby declare that the wooden packing material are totally free from bark and apparently

**free from live plant pests**

[illegible]

# Abnahmeprüfzeugnis 3.1 - DIN EN 10204:2005

Inspection Certificate 3.1 - DIN EN 10204:2005 / Certificat de Reception 3.1- DIN EN 10204:2005

**Kunde:**  
Client:

Dart Aerospace Ltd.

1270 Aberdeen Street  
K6A1K7 Hawkesbury, ON Canada

Rohre nahtlos gepresst  
Tubes seamless extruded

AMS - QQ - A - 200/11; Spezifikation Dart Aerospace D6006

**Produkt:**

Product / Produit:

**Spezifikation:**

Specification:

**Werkstoff:**

Alloy/Alliage:

**Abmessung**

Size / Dimension

**Kennzeichnung**

Marking/Marquage:

**Lieferung**

Delivered Material / Matériel délivré:

**Zeugnisnummer:**

1608/12

Cert No.: / No. du certificat:

**Bestellnummer:**

PO 15346

Order No. / No. de commande

**Auftrag:**

44989/200

Our Reference/Notre Reference:

**Zustand:**

Temper/État

T 6511

7075

3,250 INCH x 2,220 INCH x 0,515 INCH x 129,000 INCH  
D6006-129 3.250 X 0.515 X 129

CERT. NO. 1608/12 - ALUnna - 7075 - T6511 - CAST NO. 8345 - AMS - QQ - A - 200/11 - 3.250" OD X 0.515" WALL - HEAT LOT NO. 1401446 - ALUnna Order CONF. NO. 44989/200-1 - P.O. 15346  
Stück kg

**Country of Manufacture: Germany**

Products are in accordance with applicable RoHS

24

629,00

**Chemical Analysis / analyse chimique**

Other elements each max. 0,05%, total 0,15

## 1. Chemische Analyse

Charge/  
Cast No.

min.  
max.

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	Zr	Bi	Sn	Ni
		1,2		2,1	0,18	5,1						
0,40	0,50	2,0	0,30	2,9	0,28	6,1	0,20					
8345/12	0,086	0,179	1,484	0,057	2,557	0,209	5,945	0,040	0,003	0,0341	0,0001	0,0015

Hydrogen content: 0,09 ccm/100 g Al Elements without indication < 0,01 %

country of melt manufacturer: Germany

## 2. Mechanische Eigenschaften

## Mechanical Properties / Valeurs Mécaniques

Anforderungen Requirements	tensile (Rm) ksi	yield (Rp0,2) ksi	elongation 2" %	elongation A %	Hardness HB	Heat Lot No.
min. max.	77,0	66,0	7,0			
1 2	88,015 86,855	81,345 79,460	11,0 10,0			1401446

RMS: outside 25 - max. 22,0 µ"

**Ergebnis der  
Prüfungen:**

Test results:

Resultats:

Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen bei der Bestellannahme entspricht

We confirm that the delivery has been tested and applies to the agreements made on receipt of the order

Nous confirmons que la livraison a été contrôlée et correspond avec les conventions faites à la réception de la commande

22.11.2012 / Tasc



Certified acc. DIN EN ISO 9001:2008 and DIN EN 9100:2003  
valid until 2013-11-10  
Cert.- Reg. No.: 001959 QM; 001959 ASH



ALUnna

Abnahmebeauftragter

Aluminiumwerk Unna AG, Uelzener Weg 36, 59425 Unna, Germany

highest

Lowest

## EXTRUSION INSPECTION SHEET

								ULTRA SONIC MEASUREMENTS				
TUBE #	TOTAL LENGTH	SIDE A DIA two readings	SIDE B DIA two readings	INSIDE DIA	wall thickness measured w/vern	Strightness at 12" in middle	Rockwell Reading	LOCATION on tube	R1	R2	R3	R4
DWG	129.00"	3.250"		2.220"	0.515"	0.010"	N/A	Middle	N/A			
1	129.00"	3.241"/3.250"	3.243"/3.248"	2.215"	0.509"/0.516"	0.004"	N/A	Middle	0.517"	0.513"	0.510"	0.511"
2	129.00"	3.247"/3.250"	3.253"/3.254"	2.214"	0.509"/0.518"	0.0045"	N/A	Middle	0.521"	0.500"	0.518"	0.526"
3	129.00"	3.243"/3.248"	3.243"/3.248"	2.215"	0.512"/0.514"	0.0105"	N/A	Middle	0.508"	0.514"	0.519"	0.517"
4	129.00"	3.245"/3.248"	3.245"/3.249"	2.216"	0.513"/0.516"	0.005"	N/A	Middle	0.514"	0.511"	0.514"	0.516"
5	129.00"	3.239"/3.247"	3.245"/3.251"	2.216"	0.510"/0.531"	0.0045"	N/A	Middle	0.509"	0.513"	0.521"	0.518"
6	129.00"	3.247"/3.251"	3.249"/3.253"	2.220"	0.505"/0.527"	0.003"	N/A	Middle	0.514"	0.519"	0.515"	0.511"
7	129.00"	3.243"/3.249"	3.247"/3.249"	2.218"	0.506"/0.513"	0.0055"	N/A	Middle	0.519"	0.513"	0.506"	0.514"
8	129.00"	3.243"/3.249"	3.244"/3.247"	2.214"	0.507"/0.523"	0.006"	N/A	Middle	0.513"	0.508"	0.512"	0.518"
9	129.00"	3.239"/3.241"	3.245"/3.246"	2.209"	0.510"/0.529"	0.0055"	N/A	Middle	0.509"	0.508"	0.518"	0.517"
10	129.00"	3.243"/3.247"	3.247"/3.249"	2.213"	0.506"/0.523"	0.004"	N/A	Middle	0.509"	0.522"	0.516"	0.508"
11	129.00"	3.243"/3.247"	3.246"/3.251"	2.216"	0.511"/0.522"	0.010"	N/A	Middle	0.518"	0.511"	0.507"	0.518"
12	129.00"	3.244"/3.248"	3.246"/3.249"	2.217"	0.507"/0.521"	0.0075"	N/A	Middle	0.514"	0.519"	0.512"	0.514"
13							N/A	Middle				
14							N/A	Middle				
15							N/A	Middle				
PART # D6006-129		P/O# 15346			BATCH # 75633			Notes:				

MEAN OUTSIDE DIAMETER PERMISSIBLE $\pm 0.006$ side A									
Tube #	Actual A	Actual B	Mean	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.241	3.250	3.246	3.250	0.006	3.244	3.256	0.001	-0.011
2	3.247	3.250	3.249	3.250	0.006	3.244	3.256	0.004	-0.007
3	3.243	3.248	3.246	3.250	0.006	3.244	3.256	0.001	-0.011
4	3.245	3.248	3.247	3.250	0.006	3.244	3.256	0.002	-0.009
5	3.239	3.247	3.243	3.250	0.006	3.244	3.256	0.001	-0.013
6	3.247	3.251	3.249	3.250	0.006	3.244	3.256	0.005	-0.007
7	3.243	3.249	3.246	3.250	0.006	3.244	3.256	0.002	-0.010
8	3.243	3.249	3.246	3.250	0.006	3.244	3.256	0.002	-0.010
9	3.239	3.241	3.240	3.250	0.006	3.244	3.256	-0.004	-0.016
10	3.243	3.247	3.245	3.250	0.006	3.244	3.256	0.001	-0.011
11	3.243	3.247	3.245	3.250	0.006	3.244	3.256	0.001	-0.011
12	3.244	3.248	3.246	3.250	0.006	3.244	3.256	0.002	-0.010
13									
14									
15									
16									

MEAN OUTSIDE DIAMETER PERMISSIBLE $\pm 0.006$ Side B									
Tube #	Actual A	Actual B	Mean	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.243	3.248	3.246	3.250	0.006	3.244	3.256	0.001	-0.011
2	3.253	3.254	3.254	3.250	0.006	3.244	3.256	0.009	-0.002
3	3.243	3.248	3.246	3.250	0.006	3.244	3.256	0.001	-0.011
4	3.245	3.249	3.247	3.250	0.006	3.244	3.256	0.003	-0.009
5	3.245	3.251	3.248	3.250	0.006	3.244	3.256	0.004	-0.008
6	3.249	3.253	3.251	3.250	0.006	3.244	3.256	0.007	-0.005
7	3.247	3.249	3.248	3.250	0.006	3.244	3.256	0.004	-0.008
8	3.244	3.247	3.246	3.250	0.006	3.244	3.256	0.001	-0.011
9	3.245	3.246	3.246	3.250	0.006	3.244	3.256	0.001	-0.011
10	3.247	3.249	3.248	3.250	0.006	3.244	3.256	0.004	-0.008
11	3.246	3.251	3.249	3.250	0.006	3.244	3.256	0.004	-0.007
12	3.246	3.249	3.248	3.250	0.006	3.244	3.256	0.003	-0.008
13									
14									
15									
16									

OUTSIDE DIA. Permissible (with Ovality) $\pm 0.012$ side A							
Tube #	Actual A	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.241	3.250	0.012	3.238	3.262	0.003	-0.021
2	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
3	3.243	3.250	0.012	3.238	3.262	0.005	-0.019
4	3.245	3.250	0.012	3.238	3.262	0.007	-0.017
5	3.239	3.250	0.012	3.238	3.262	0.001	-0.023
6	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
7	3.243	3.250	0.012	3.238	3.262	0.005	-0.019
8	3.243	3.250	0.012	3.238	3.262	0.005	-0.019
9	3.239	3.250	0.012	3.238	3.262	0.001	-0.023
10	3.243	3.250	0.012	3.238	3.262	0.005	-0.019
11	3.243	3.250	0.012	3.238	3.262	0.005	-0.019
12	3.244	3.250	0.012	3.238	3.262	0.006	-0.018
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) $\pm 0.012$ side b							
Tube #	Actual A	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.243	3.250	0.012	3.238	3.262	0.005	-0.019
2	3.253	3.250	0.012	3.238	3.262	0.015	-0.009
3	3.243	3.250	0.012	3.238	3.262	0.005	-0.019
4	3.245	3.250	0.012	3.238	3.262	0.007	-0.017
5	3.245	3.250	0.012	3.238	3.262	0.007	-0.017
6	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
7	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
8	3.244	3.250	0.012	3.238	3.262	0.006	-0.018
9	3.245	3.250	0.012	3.238	3.262	0.007	-0.017
10	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
11	3.246	3.250	0.012	3.238	3.262	0.008	-0.016
12	3.246	3.250	0.012	3.238	3.262	0.008	-0.016
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) $\pm 0.012$ side A							
Tube #	Actual B	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.250	3.250	0.012	3.238	3.262	0.012	-0.012
2	3.250	3.250	0.012	3.238	3.262	0.012	-0.012
3	3.248	3.250	0.012	3.238	3.262	0.010	-0.014
4	3.248	3.250	0.012	3.238	3.262	0.010	-0.014
5	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
6	3.251	3.250	0.012	3.238	3.262	0.013	-0.011
7	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
8	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
9	3.241	3.250	0.012	3.238	3.262	0.003	-0.021
10	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
11	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
12	3.248	3.250	0.012	3.238	3.262	0.010	-0.014
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) $\pm 0.012$ side b							
Tube #	Actual B	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	3.248	3.250	0.012	3.238	3.262	0.010	-0.014
2	3.254	3.250	0.012	3.238	3.262	0.016	-0.008
3	3.248	3.250	0.012	3.238	3.262	0.010	-0.014
4	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
5	3.251	3.250	0.012	3.238	3.262	0.013	-0.011
6	3.253	3.250	0.012	3.238	3.262	0.015	-0.009
7	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
8	3.247	3.250	0.012	3.238	3.262	0.009	-0.015
9	3.246	3.250	0.012	3.238	3.262	0.008	-0.016
10	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
11	3.251	3.250	0.012	3.238	3.262	0.013	-0.011
12	3.249	3.250	0.012	3.238	3.262	0.011	-0.013
13							
14							
15							
16							

end measuement with vern

Mean OUTSIDE DIA. Permissible +- 0.015									
Tube	Actual A	Actual B	Mean	Nominal	Tolerance	min	max	min	max
1	0.509	0.516	0.513	0.515	0.015	0.500	0.530	0.0125	-0.018
2	0.509	0.518	0.514	0.515	0.015	0.500	0.530	0.0135	-0.017
3	0.512	0.514	0.513	0.515	0.015	0.500	0.530	0.013	-0.017
4	0.513	0.516	0.515	0.515	0.015	0.500	0.530	0.0145	-0.016
5	0.510	0.531	0.521	0.515	0.015	0.500	0.530	0.0205	-0.010
6	0.505	0.527	0.516	0.515	0.015	0.500	0.530	0.016	-0.014
7	0.506	0.513	0.510	0.515	0.015	0.500	0.530	0.0095	-0.021
8	0.507	0.523	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
9	0.510	0.529	0.520	0.515	0.015	0.500	0.530	0.0195	-0.011
10	0.506	0.523	0.515	0.515	0.015	0.500	0.530	0.0145	-0.016
11	0.511	0.522	0.517	0.515	0.015	0.500	0.530	0.0165	-0.014
12	0.507	0.521	0.514	0.515	0.015	0.500	0.530	0.014	-0.016
13									
14									
15									

OUTSIDE DIA. Permissible +- 0.038								
Tube	Actual A	Actual B	Nominal	Tolerance	min	max	min	max
1	0.509	0.516	0.515	0.038	0.477	0.553	0.032	-0.037
2	0.509	0.518	0.515	0.038	0.477	0.553	0.032	-0.035
3	0.512	0.514	0.515	0.038	0.477	0.553	0.035	-0.039
4	0.513	0.516	0.515	0.038	0.477	0.553	0.036	-0.037
5	0.510	0.531	0.515	0.038	0.477	0.553	0.033	-0.022
6	0.505	0.527	0.515	0.038	0.477	0.553	0.028	-0.026
7	0.506	0.513	0.515	0.038	0.477	0.553	0.029	-0.040
8	0.507	0.523	0.515	0.038	0.477	0.553	0.030	-0.030
9	0.510	0.529	0.515	0.038	0.477	0.553	0.033	-0.024
10	0.506	0.523	0.515	0.038	0.477	0.553	0.029	-0.030
11	0.511	0.522	0.515	0.038	0.477	0.553	0.034	-0.031
12	0.507	0.521	0.515	0.038	0.477	0.553	0.030	-0.032
13								
14								
15								

## center measurment with ultra sonic

Mean OUTSIDE DIA. Permissible +- 0.015									
Tube	highest	lowest	Mean	Nominal	Tolerance	min	max	min	max
1	0.517	0.510	0.514	0.515	0.015	0.500	0.530	0.0135	-0.017
2	0.526	0.500	0.513	0.515	0.015	0.500	0.530	0.013	-0.017
3	0.519	0.508	0.514	0.515	0.015	0.500	0.530	0.0135	-0.017
4	0.516	0.511	0.514	0.515	0.015	0.500	0.530	0.0135	-0.017
5	0.521	0.509	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
6	0.519	0.511	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
7	0.519	0.506	0.513	0.515	0.015	0.500	0.530	0.0125	-0.018
8	0.518	0.508	0.513	0.515	0.015	0.500	0.530	0.013	-0.017
9	0.518	0.508	0.513	0.515	0.015	0.500	0.530	0.013	-0.017
10	0.522	0.508	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
11	0.518	0.507	0.513	0.515	0.015	0.500	0.530	0.0125	-0.018
12	0.519	0.511	0.515	0.515	0.015	0.500	0.530	0.015	-0.015
13									
14									
15									

OUTSIDE DIA. Permissible +- 0.038								
Tube	highest	lowest	Nominal	Tolerance	min	max	min	max
1	0.517	0.510	0.515	0.038	0.477	0.553	0.040	-0.043
2	0.526	0.500	0.515	0.038	0.477	0.553	0.049	-0.053
3	0.519	0.508	0.515	0.038	0.477	0.553	0.042	-0.045
4	0.516	0.511	0.515	0.038	0.477	0.553	0.039	-0.042
5	0.521	0.509	0.515	0.038	0.477	0.553	0.044	-0.044
6	0.519	0.511	0.515	0.038	0.477	0.553	0.042	-0.042
7	0.519	0.506	0.515	0.038	0.477	0.553	0.042	-0.047
8	0.518	0.508	0.515	0.038	0.477	0.553	0.041	-0.045
9	0.518	0.508	0.515	0.038	0.477	0.553	0.041	-0.045
10	0.522	0.508	0.515	0.038	0.477	0.553	0.045	-0.045
11	0.518	0.507	0.515	0.038	0.477	0.553	0.041	-0.046
12	0.519	0.511	0.515	0.038	0.477	0.553	0.042	-0.042
13								
14								
15								



